Testimony before the U.S.-China Economic and Security Review Commission

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China's Energy Consumption and Opportunities for U.S.-China Cooperation to Address the Effects of China's Energy Use

Since 1999, I have directed the China Environment Forum at the Woodrow Wilson Center. In the China Environment Forum we convene meetings and create publications that promote dialogue among U.S. and Chinese scholars, policymakers, businesses, and nongovernmental organizations (NGOs) on environmental and energy challenges in China. In the course of my work I have become acquainted with many government, NGO, business, and research representatives from the United States and Asia who are active in projects and policy development to address China's energy challenges. I draw much of my comments today from insights I have learned in working with many of these on-the-ground energy practitioners, as well as from work the China Environment Forum has been doing with Western Kentucky University on the China Environmental Health Project, an initiative supported by the U.S. Agency for International Development. I would like to note that my comments today are my personal opinion and they do not reflect the views of the Woodrow Wilson Center. In my seven minutes I have four points to make about the environmental impacts of China's energy use and I will highlight some opportunities for U.S.-China cooperation. I welcome the discussion with the commission and Dr. Ho after my comments.

1) ***Transboundary Impacts of China's Air Pollution and Energy Consumption.*** China already consumes more energy and emits more greenhouse gases than any country except the United States. It is expected to surpass the United States in CO_2 emissions sometime later this year. Carbon dioxide (CO_2) emissions, sulfur dioxide (SO_2) and mercury emissions from coal burning are some of the main transboundary pollutants from China. Besides pollution emissions from China, many of the China Exim Bank investments into oil and other resource extraction internationally have degraded the environment overseas, particularly in Africa. However, in recent months China Exim Bank has initiated dialogues with other international financial institutions on improving its transparency and strengthening oversight of the environmental and social impacts of its investments.

2) ***Air Pollution Drivers.*** The main drivers of China's air pollution problems are dependence on coal for energy, growing car use and, most crucially, the country's weak environmental governance system. Over the past few years the Chinese government, often with international assistance, has been initiating many progressive energy policies and pilot projects, as well as opening more space for international and domestic environmental nongovernmental organizations (NGOs) to work in this area.

3) ***Economic and Health Costs of Air Pollution in China.*** China is the largest producer and consumer of coal in the world. Abundant natural coal reserves have fueled China's booming economic development; however, the increasing domestic

health threats from coal-fired power plants, a poorly regulated coal mining sector, and coal briquette use in rural homes pose significant challenges for the Chinese government to address due to local government protectionism and a weak health care system. The serious environmental and public health problems created by coal use may nullify much of China's GDP growth.

4) ***Challenges and Opportunities of China's Continued Coal Dependence and Development of Alternative Energy Sources***. Over the past few years the Chinese government has diversified its energy portfolio to expand nuclear and renewable energy development, particularly hydropower, which is slated to quadruple by 2020. However, due to exploding energy demand, the dependence on coal will remain around 70% for the next two decades. This continued dependence highlights the need for even more collaboration with China on energy efficiency initiatives, clean coal technologies and policies to help improve the capacity of China's environmental watchdogs to better monitor power plants and enforce emissions control and trading policies. International assistance could also improve the design and planning of renewable energy projects, particularly hydropower, in which the lack of local government accountability often has led to ill-conceived and poorly executed dams that do not take ecological and human livelihood costs into account. The U.S. government has been much less involved and less consistent in working with China on clean energy and energy efficiency than many other bilateral, multilateral, and nongovernmental clean energy initiatives. The fairly significant number of U.S. NGOs and bi/multilateral organizations engaged in improving China's energy development offers the U.S. government many opportunities for forming partnerships in clean energy and energy efficiency work in China.

1) China's Domestic and Transboundary Air Pollution

China has the dubious distinction of having 16 out of the world's 20 most polluted cities. Beijing's efforts to clean up the city's air before hosting the 2008 summer Olympics have highlighted China's broader challenge in addressing the serious urban air pollution from cars, coal, and dust (from desertification and construction). Rural areas also face serious indoor air pollution challenges from coal burning for household use.

Coal, most of it dirty, fuels 70 percent of China's energy and is the main source of the country's domestic and transboundary air pollution. Notably, in the 1990s as many Chinese cities shifted away from coal to natural gas heating, personal car ownership grew phenomenally (although still quite low when compared to per capita rates in industrialized countries). Today, CO_2 emissions from cars have replaced coal as the major source of air pollution in major Chinese cities. Despite considerable efforts to promote energy efficiency and renewables, China will remain dependent upon coal for the foreseeable future.

The lack of widespread coal washing infrastructure and scrubbers at Chinese industrial facilities and power plants highlight the potential negative domestic and global air impacts of China's plans to build 562 new coal-fired power stations by 2012. China already emits more greenhouse gases (GHG) than any country except the United States, and is expected to surpass the United States in GHG emissions sometime this year (although cumulatively, U.S. CO_2 emissions will be greater since it remains in the atmosphere for nearly 100 years). The expansion of China's power plants alone could nullify the cuts required under the Kyoto

Protocol from industrialized countries.

Regionally, sulfur dioxide (SO_2) and mercury emissions from coal burning are some of the main pollutants spreading from China. Acid rain resulting from coal and fossil fuel combustion has damaged nearly one-third of China's limited cropland and also severely degraded forests and watersheds on the Korean Peninsula and in Japan.

Particulates, mercury, and dust from China are also worsening air quality as far away as the U.S. west coast. While mercury is insoluble as it leaves smokestacks in China, by the time it reaches the U.S. west coast it transforms into a reactive gaseous material that dissolves easily in the wet Pacific Northwest. While it is difficult to track the exact sources of overseas pollutants, some U.S. researchers have estimated that approximately one-third of California's fine particulate pollution originates from Asia. There are concerns in California and other west coast states that these pollutants could potentially nullify their progress in meeting stricter Clean Air Act requirements. In May 2006, researchers at the University of California-Davis claimed that nearly all the particulate matter over Lake Tahoe originated from China. The researchers of one study featured in *The Oregonian* posited that at least one-fifth of the mercury entering the Willamette River in Oregon comes from abroad, most likely from China. This mercury is even beginning to build up to toxic levels in the local wildlife.

Notably in China, data on carbon dioxide (CO_2) and mercury emissions from coal burning have not been released since 2001. Unconfirmed data estimate that China releases 400 to 600 tons of mercury each year (U.S. emissions are approximately 48 tons each year). Coal burning in China is possibly emitting up to 25 percent of global mercury. A 2006 the Chinese State Environmental Protection Administration (SEPA) survey found that 41 percent of fish species in water bodies in eastern Jiangsu Province, where there is a high concentration of manufacturers, contained various heavy metals transmitted through polluted air fall-out. The lack of data in China on air emissions complicates efforts at promoting emissions trading and environmental information disclosure programs and highlights an area where more international collaboration could be very useful.

Another often overlooked pollutant creating hazy skies in China and beyond is black carbon (BC) soot. BC—the active ingredient in haze produced by vehicles, burning crop residues, and household stoves—is potentially the second most important global warming gas after CO_2. China is the largest BC-emitting country in the world (responsible for 17 percent) and small BC particles are causing hundreds of thousands of premature deaths from respiratory illnesses each year in China. In combination with SO_2, BC particles are blocking sunlight and may be lowering crop yields by 30 percent for grain crops in China. Regionally, BC emissions may be heating the atmosphere and destabilizing weather in China and in the Pacific region.

Another environmental impact linked to China's energy consumption is China's overseas investments into oil and other resource extraction. China's export credit and guarantee agencies—in particular China Exim Bank and Sinosure—have played an important role in fostering the rapid expansion of Chinese trade and overseas investment. In 2005, China Exim Bank approved loans with a volume of $20 billion. Established only in 1994, the institution has grown to become the world's third largest export credit agency, financing

many oil, mining, dam, and other infrastructure projects in the Africa and Latin America. China Exim lending practices tend to follow China's foreign policy, with package deals frequently focusing on projects that provide access to raw materials, and on concessional loans for economically and politically important countries. In Africa, China Exim Bank is investing in many much-needed infrastructure projects, but often without strict social and environmental standards, which potentially undermine efforts to bring about good governance, environmental protection and social justice. Over the past few months there have been signs that China Exim Bank is becoming more receptive to improving its oversight of investments—it recently released its environmental policy documents and has begun discussions with the World Bank on strengthening the environmental and social impacts of its investments. The U.S. government could also become involved in working with China Exim Bank to help bring it up to international standards on environmental protection.

2) Main Drivers of Air Pollution Problems

While China's large population and rapid economic growth are driving its phenomenal energy consumption, it is the country's dependence on coal combined with a weak environmental governance system that explain the considerable air pollution and other ecological damage from the energy sector.

In 1979, Deng Xiaoping granted local governments considerable authority to promote economic growth, which they have, but at a major cost to the environment. Strong local governments routinely ignore the poorly funded and understaffed State Environmental Protection Administration (SEPA) and its local bureaus. As the above section indicated, China's failing environmental governance system not only poses domestic health and ecological threats, but also is creating negative environmental impacts regionally and globally.

To push better energy conservation and pollution control from power plants at the local level, the central government has passed progressive energy laws that create incentives for local officials to develop clean coal and renewable energy sources. There is also a continued, yet still unsuccessful effort to create a green GDP system to judge local officials on their environmental performance. A number of U.S. research institutions and NGOs—many with funding from the Energy Foundation—have been pursuing energy conservation and clean energy programs with both central and local governments over the past decade. Some of the most promising kinds of international projects are those working to build the capacity of local governments in the energy sector. For example, Natural Resources Defense Council and the China-U.S. Energy Efficiency Alliance have brought together the Jiangsu Provincial Economic & Trade Commission, the California Public Utilities Commission, and California Energy Commission to develop end-use energy efficiency incentive (demand-side management) programs in Jiangsu Province. Another vital local capacity building effort that could significantly improve SEPA's ability to monitor and enforce air pollution control laws is the creation of six regional environmental protection offices. The U.S. Environmental Protection Agency is working with their Chinese counterparts on this promising initiative, which is notably funded by the Asian Development Bank.

3) Growing Economic and Health Costs from Coal Burning

In 2006, the Chinese State Environmental Protection Administration estimated that environmental degradation and pollution cost the economy at least 10 percent of its GDP

annually. Acid rain alone is causing ecological degradation and human health problems that cost the country $13 billion annually. Statistics in China are often difficult to find or verify, but overall studies on China's air pollution indicate serious threats to economic growth, the environment, and human health:

• Climate experts within China link greenhouse gas emissions and deforestation to the rising incidences of natural disasters witnessed in the first half of 2006, which forced the evacuation and relocation of 13.2 million people and killed more than 2,300, causing direct economic losses of $24 billion.

• China's Meteorological Administration has estimated that air pollution is driving some extreme weather events, which hamper China's economic growth by between 3 to 6 percent of GDP, or $70-130 billion, annually.

• Estimates on respiratory illnesses from China's air pollution leading to early deaths range from 300,000 to 500,000.

• Indoor air pollution—much from burning coal briquettes—contributes significantly to the leading cause of death among children in rural China—pneumonia. With 80 percent of the population using solid fuels (particularly coal briquettes), the World Health Organization estimates that 394,200 people die annually from indoor air pollution in China. Respiratory problems are particularly acute in China's countryside because many rural residents lack any form of health coverage and medical care has become prohibitively expensive as the industry increasingly is privatized. A recent WHO survey has ranked China 187th out of 191 countries in terms of equality to medical treatment.

• Air pollution also poses a threat to international investment in China. In February 2007 the China Environment Forum hosted a talk on air pollution and health in southern China in which Christine Loh, founder of the Hong Kong think tank Civic Exchange, suggested that Hong Kong could lose its status as the economic hub of Asia if the city does not clean up its skies. One sign the financial sector may already be fleeing smoggy Hong Kong was a statement from Merrill Lynch recommending that investors switch their real estate investments from Hong Kong to Singapore, a city with significantly cleaner air. In the long run other Chinese cities may experience a similar flight in international investment. Beijing and Shanghai are already considered hardship posts for employees of international companies due to the poor environmental quality.

Environmental and Health Impacts of Coal Mining Sector

Linfen—a major coalmining city in Shanxi Province—has been dubbed the most polluted city in the world by the World Bank. The coal industry has greatly boosted the city's economic development; however, it has led to the dramatic deterioration of the environment and a rise in major health problems. Crops are covered in grey dust and considered toxic, and the coal pollution dust is so great cars must use headlights during the day. City residents suffer from respiratory illnesses from the severe pollution generated by dozens of coal mines surrounding the city. Many other cities, particularly in northern China face similar problems from coal mining.

Coal production in China has increased about 66 percent over the past 5 years from 1.38

billion tons in 2001 to 2.3 billion tons in 2006. China's huge coal mining sector is strikingly antiquated and highly polluting when compared to the industry in developed countries. China has approximately 30,000 coal mines, 80 percent of which are small mines, which are the major source of the environment, safety, and public health problems. Besides air pollution, degradation of water and land are growing environmental problems. Enforcement of laws to limit these problems is weak and mines are thus not pushed to internalize the costs of their production. Some of the key environmental impacts from coal mining include:

• *Methane Emissions.* Globally, coal mines release about 8 percent—nearly half—of all human-induced methane emissions. China is the world's leading emitter of coal mine methane. With a global warming potential 23 times greater than CO_2, methane is a potent greenhouse gas, which highlights the significant impact a decrease in methane emissions could have on limiting potential global climate change. Methane in mines is also responsible for many explosions, the main cause of miner deaths in China. Besides methane, 731,300 tons of SO_2 and soot are emitted each year from Chinese coal mines. Soot pollution contributes to local and global climate change. In 2004, the U.S. government launched in 2004 the Methane to Markets Partnership, which includes 18 national governments and nearly 200 private sector companies that aim to help overcome the financial, regulatory, and technical barriers to coal mine methane (CMM) recovery projects. Such projects capture methane, improve safety of mines, and provide a clean energy source for communities surrounding mines. There are currently thirty CMM projects in China.

• *Water Quality and Quantity Threats.* A large amount of toxic wastewater from mines is discharged without any treatment in China. The discharged wastewater combined with runoff from mine tailings has greatly polluted surface water and groundwater in mine areas, often contaminating soils and crops. The need for water to wash coal has stressed already water-scarce regions in northern China, particularly Shanxi, one of the major coal producing provinces. In some mining areas, the underground water level has dropped considerably because of coal exploitation.

• *Expanding Waste Land and Desertification.* China has about 13.3 million hectare waste land, and about 46,667 hectares of land is destroyed by coal mining every year, 66.7 percent of which is arable land. Mining is also one of the factors exacerbating desertification in northern China.

• *Land Subsidence and Seawater Intrusion.* In Shanxi, the largest coal producing province in China, about one million people have been affected by land subsidence from mines over the past few years. Seawater intrusion has occurred in some of China's coastal mine areas due to pumping of water from mines, which contaminates freshwater resources (which are quite limited in China) and cropland surrounding the mines.

• *Human Health Risks.* Mine workers face many health risks, such as dust-related lung diseases, hearing loss, neuromuscular disorders, and rheumatism. According to China's Ministry of Health figures, of the approximately one million people in China suffering from pneumoconiosis (black lung disease), 600,000 are miners. The number of miners falling ill from pneumoconiosis increases by approximately 70,000 every year. Every year, nearly 80 percent of the world's total deaths in coal mine accidents occur in China, underscoring the poor state of safety measures and regulation of Chinese mines.

4) Challenges and Opportunities of China's Continued Coal Dependence and Development of Alternative Energy Sources

While the air quality problems linked to energy production are grim, another major area of environmental challenge linked to energy production is actually the destruction of water resources—some of which stems from coal mining tailings, fall out of air pollutants, and hydropower plant construction. These forms of water resource degradation exacerbate other pollutants in water, which have left half of China's rivers so polluted that their water cannot (or should not) be used by industry, agriculture or drinking. Twenty-five percent of the Chinese population, mainly in rural areas, is drinking unclean water. Anecdotal evidence indicates that cancer, tumor, and miscarriage rates in many of China's heavily polluted river basins are on the rise.

China is facing serious shortages of energy as its rapid economic expansion further strains its limited natural resources. Over the past few years a new round of dam building in southwest China aims to triple China's hydropower capacity by 2020. China, already the biggest hydropower user in the world, is home to 86,000 dams—22,000 of which are large dams, accounting for 45 percent of large dams in the world. Tripling China's hydropower capacity would mean:

• Fragmentation of ecosystems across China and in downstream neighboring states;
• Impoverishment of biodiversity and pristine rivers in China; and,
• Displacement of more than one million people from their ancestral homeland in the deep valleys of China's hilly southwest.

The construction on China's largest dam—the Three Gorges Dam on the Yangtze River had been debated for decades in China before the government approved the plan in 1992. The goals of the dam were to improve flood control and navigation on the river and provide nearly 11 percent of China's energy needs. In order to prevent siltation of the Three Gorges Dam, Chinese planners now aim to build 6 large dams on the trunk of the Yangtze River. In addition to these major dams on the Yangtze, along its tributaries and other rivers in southwest China there are 200+ dams planned. Chinese environmental NGOs and environmentalists worry that the current massive hydropower development will severely overexploit China's rivers and result in serious environmental and social harm.

Most of the local NGOs doing this work on this issue are not ideologically against dams, rather proponents of transparent decision-making—most of the current dams are local government initiatives that fail to carry out environmental impact assessments or involve local communities in the decision-making process.

The Nature Conservancy is one U.S. NGO that is working with the Chinese government to promote more ecological considerations in dam building. In terms of promoting transparency in construction projects like dams and factories in China, the American Bar Association, National Democratic Institute, and EcoLinx Foundation are carrying out training projects focused on strengthening China's environmental impact assessment processes and public participation in environmental decision-making.

Opportunities for Energy Collaboration with China

China's regional and global pollution is fueled both by weak environmental governance domestically and by the burgeoning demand internationally for cheap Chinese goods. This demand drives China's economic machine and its pollution. For example, there are estimates that 7 percent of China's CO_2 emissions are due to production of U.S. imports.

A growing number of bilateral and multilateral aid agencies and NGOs have established clean coal, energy efficiency, urban transport, and renewable energy projects in China, as well as undertaken environmental governance initiatives that strengthen local regulators and society. Chinese environmental NGOs have begun to take on more sensitive issues such as a national campaign to demand more transparency in dam-building decision-making and assisting pollution victims in class action court cases.

The Chinese central leadership has vowed to significantly reduce air pollution from the energy sector by passing ambitious laws and pronouncements prioritizing renewable energy and energy efficiency, including more fuel-efficient automobiles. China's notoriously weak environmental watchdog agency has been flexing its muscles more over the past two years, pushing for prosecuting firms for toxic chemical spills, cracking down on major polluters or environmentally damaging dam projects by using a newly strengthened environmental impact assessment law, and passing regulations to give the public a greater voice in environmental policymaking.

All of these progressive policy developments and growing international assistance in China's energy sector highlight numerous areas in which the U.S. government could become more involved. Notably, despite the alarming environmental degradation and human health trends linked to China's energy use, energy issues have not occupied a prominent position in U.S.-China relations. To the extent that energy and environmental issues have been considered at all, U.S. policy regarding cooperation with China in these areas has not been sustained or consistent, reflecting tensions in the U.S.-China relationship, disagreements between past administrations and Congress, and the higher priorities given to other issues in the relationship. There are some new opportunities for strengthening Sino-U.S. energy cooperation such as the Sino-U.S. Strategic Economic Dialogue held in December 2006. This meeting catalyzed a Joint Economic Study that is focusing on identifying cost-effective solutions to improve air quality and energy efficiency in both countries, as well as recommend policies, regulations, and institutions for China to meet its energy efficiency and clean energy targets in its Eleventh Five-Year Plan. SED also prompted the renewal of the Sino-U.S. Protocol on Energy Efficiency and Renewable Energy, which the Department of Energy had allowed to expire in February 2005. If the U.S. government prioritizes energy cooperation with China there are not only environmental and human health benefits globally, but such collaboration could play an important role in building up good will and offsetting tensions in other parts of the Sino-U.S. relationship.

Resources

Portions of this testimony document were drawn from China Environment Forum publications and online research briefs and meeting summaries. I list some of my project's resources and other publications on China's energy challenges below.

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